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Ephemeris for Physical Observations of the Moon for the Second Half of 1899. By A. C. D. Crommelin.

Greenwich Midnight.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration Sel. Long. of the Earth.	Geocentric Libration Lat. of the Earth.	Combined Amount.	Direction.
1899.	°	°	°	°	°	°
July 1	195·76	−0·30	+6·74	−5·71	8·83	229·7
2	208·00	0·33	+6·59	−4·72	8·11	234·4
3	220·24	0·35	+6·15	−3·52	7·07	240·2
4	232·49	0·37	+5·47	−2·17	5·91	248·4
5	244·73	0·40	+4·58	−0·75	4·63	260·7
6	256·98	0·42	+3·52	+0·70	3·59	281·2
7	269·24	−0·44	+2·33	+2·09	3·12	311·9
8	281·49	0·47	+1·05	+3·38	3·55	342·7
9	293·74	0·49	−0·28	+4·52	4·54	3·5
10	305·98	0·51	−1·63	+5·46	5·68	16·6
11	318·22	0·53	−2·95	+6·16	6·84	25·6
12	330·47	0·56	−4·19	+6·61	7·80	32·4
13	342·70	−0·58	−5·31	+6·77	8·60	38·1
14	354·93	0·61	−6·24	+6·63	9·08	43·3
15	7·16	0·63	−6·93	+6·17	9·29	48·3
16	19·38	0·66	−7·30	+5·41	9·05	53·5
17	31·59	0·68	−7·31	+4·33	8·48	59·4
18	43·79	0·71	−6·90	+2·99	7·52	66·6
19	55·99	−0·74	−6·06	+1·42	6·24	76·8
20	68·19	0·76	−4·79	−0·28	4·80	93·3
21	80·37	0·79	−3·15	−2·00	3·72	122·4
22	92·56	0·82	−1·25	−3·61	3·82	160·9
23	104·74	0·85	+0·79	−4·98	5·03	189·0
24	116·93	0·87	+2·78	−5·98	6·58	204·9
25	129·12	−0·89	+4·57	−6·57	8·01	214·8
26	141·32	0·92	+6·03	−6·71	8·99	221·9
27	153·53	0·94	+7·05	−6·44	9·52	227·6
28	165·74	0·96	+7·62	−5·80	9·60	232·7
29	177·96	0·98	+7·74	−4·86	9·13	237·9
30	190·18	0·99	+7·46	−3·69	8·36	243·7
31	202·41	−1·01	+6·84	−2·38	7·25	250·8
Aug. 1	214·65	1·03	+5·94	−0·98	6·00	260·6
2	226·89	−1·04	+4·85	+0·43	4·87	275·1

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Greenwich Midnight.	Selenographical		Geocentric Libration		Combined Amount.	Direction.
	Colong.	Lat.	Sel. Long.	Lat.		
	of the Sun.		of the Earth.			
1899.	°	°	°		°	°
Aug. 3	239·13	–1·06	+3·62	+1·81	4·05	296·6
4	251·38	1·08	+2·31	+3·08	3·85	323·1
5	263·62	1·09	+0·96	+4·25	4·38	347·3
6	275·87	–1·11	–0·38	+5·21	5·23	4·2
7	288·11	1·12	–1·70	+5·95	6·19	16·0
8	300·35	1·14	–2·96	+6·43	7·07	24·7
9	312·59	1·16	–4·13	+6·63	7·82	31·9
10	324·83	1·17	–5·19	+6·54	8·37	38·4
11	337·06	1·19	–6·09	+6·15	8·67	44·7
12	349·29	–1·21	–6·78	+5·47	8·68	51·1
13	1·51	1·23	–7·23	+4·50	8·53	58·1
14	13·72	1·25	–7·35	+3·28	8·01	66·0
15	25·93	1·26	–7·09	+1·84	7·30	75·5
16	38·13	1·28	–6·41	+0·25	6·42	87·8
17	50·32	1·30	–5·28	–1·41	5·49	105·0
18	62·50	–1·32	–3·74	–3·01	4·79	128·8
19	74·69	1·33	–1·85	–4·44	4·80	157·4
20	86·87	1·35	+0·25	–5·57	5·58	182·6
21	99·14	1·36	+2·38	–6·30	6·74	200·7
22	111·22	1·38	+4·36	–6·58	7·90	213·5
23	123·40	1·39	+5·99	–6·42	8·80	223·0
24	135·59	–1·40	+7·18	–5·85	9·26	230·8
25	147·78	1·41	+7·87	–4·95	9·29	237·8
26	159·98	1·42	+8·04	–3·81	8·92	244·6
27	172·19	1·43	+7·76	–2·51	8·15	252·1
28	184·40	1·43	+7·08	–1·12	7·15	261·0
29	196·62	–1·44	+6·11	+0·29	6·12	272·7
30	208·84	1·44	+4·93	+1·66	5·23	288·6
31	221·07	1·45	+3·62	+2·94	4·67	309·1
Sept. 1	233·29	1·45	+2·26	+4·08	4·65	331·0
2	245·52	–1·46	+0·90	+5·05	5·14	349·9
3	257·76	–1·47	–0·41	+5·80	5·82	4·0
4	269·99	1·47	–1·65	+6·29	6·48	14·7
5	282·23	1·48	–2·79	+6·52	7·11	23·2
6	294·46	1·48	–3·82	+6·45	7·55	30·6
7	306·69	1·49	–4·73	+6·09	7·74	37·8
8	318·92	1·49	–5·50	+5·43	7·70	45·4
9	331·14	–1·50	–6·10	+4·51	7·56	53·6

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Greenwich Midnight.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration Sel. Long. of the Earth.	Geocentric Libration Lat. of the Earth.	Combined Amount.	Direction.
1899.						
Sept. 10	343°·36	−1°·51	−6°·49	+3°·34	7°·27	62°·8
11	355·57	1·51	−6·63	+1·98	6·90	73·4
12	7·77	1·52	−6·47	+0·47	6·48	85·8
13	19·97	1·52	−5·94	−1·10	6·06	100·5
14	32·16	1·53	−5·03	−2·65	5·68	117·8
15	44·34	−1·53	−3·73	−4·07	5·53	137·5
16	56·51	1·53	−2·08	−5·24	5·66	158·3
17	68·68	1·54	−0·19	−6·07	6·08	178·2
18	80·84	1·54	+1·80	−6·49	6·75	195·5
19	93·01	1·53	+3·71	−6·45	7·42	209·9
20	105·17	1·53	+5·34	−5·98	8·01	221·8
21	117·34	−1·53	+6·56	−5·13	8·33	232·0
22	129·51	1·52	+7·31	−4·01	8·33	241·3
23	141·69	1·52	+7·55	−2·69	8·00	250·4
24	153·87	1·51	+7·33	−1·27	7·40	260·2
25	166·06	1·51	+6·69	+0·17	6·69	271·5
26	178·25	1·50	+5·74	+1·56	5·97	285·2
27	190·45	−1·49	+4·53	+2·86	5·35	302·2
28	202·65	1·48	+3·26	+4·02	5·19	321·0
29	214·86	1·48	+1·91	+5·00	5·35	339·1
30	227·07	1·47	+0·58	+5·76	5·81	354·2
Oct. 1	239·29	1·46	−0·68	+6·28	6·34	6·2
2	251·50	1·45	−1·80	+6·52	6·78	15·4
3	263·72	−1·45	−2·79	+6·47	7·06	23·3
4	275·94	1·44	−3·63	+6·13	7·11	30·6
5	288·16	1·43	−4·30	+5·48	6·96	38·1
6	300·38	1·42	−4·82	+4·56	6·65	46·6
7	312·59	1·42	−5·17	+3·39	6·20	56·7
8	324·80	1·41	−5·36	+2·03	5·74	69·3
9	337·01	−1·40	−5·35	+0·54	5·39	84·2
10	349·20	1·39	−5·11	−1·01	5·21	101·2
11	1·39	1·39	−4·61	−2·53	5·26	118·8
12	13·58	1·38	−3·84	−3·93	5·50	135·7
13	25·75	1·37	−2·77	−5·12	5·85	151·6
14	37·92	1·36	−1·44	−6·00	6·18	166·5
15	50·08	−1·35	+0·08	−6·50	6·50	180·7
16	62·24	1·33	+1·69	−6·57	6·77	194·4
17	74·39	−1·31	+3·24	−6·21	7·02	207·6

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Greenwich Midnight.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration Sel. Long. of the Earth.	Geocentric Libration Lat. of the Earth.	Combined Amount.	Direction.
1899.	°	°	°	°	°	°
Oct. 18	86·54	−1·30	+4·59	−5·45	7·14	220·1
19	98·69	1·28	+5·65	−4·37	7·06	232·3
20	110·84	1·26	+6·29	−3·05	6·98	244·1
21	122·99	−1·24	+6·51	−1·59	6·71	256·3
22	135·15	1·22	+6·31	−0·10	6·31	279·1
23	147·31	1·20	+5·72	+1·36	5·89	283·4
24	159·48	1·18	+4·82	+2·73	5·54	299·5
25	171·66	1·16	+3·70	+3·94	5·40	316·8
26	183·84	1·14	+2·44	+4·97	5·52	333·9
27	196·02	−1·12	+1·12	+5·77	5·89	349·0
28	208·21	1·10	−0·17	+6·33	6·33	1·5
29	220·40	1·08	−1·36	+6·62	6·75	11·6
30	232·60	1·06	−2·41	+6·62	7·02	20·0
31	244·80	1·04	−3·27	+6·32	7·11	27·4
Nov. 1	257·00	1·03	−3·91	+5·71	6·91	34·4
2	269·20	−1·01	−4·33	+4·80	6·48	42·1
3	281·41	0·99	−4·53	+3·64	5·80	51·2
4	293·61	0·97	−4·54	+2·26	5·08	63·5
5	305·81	−0·95	−4·35	+0·73	4·39	80·5
6	318·01	−0·94	−3·99	−0·86	4·07	102·2
7	330·20	0·92	−3·46	−2·43	4·22	125·1
8	342·39	0·90	−2·77	−3·87	4·76	144·4
9	354·57	0·88	−1·93	−5·09	5·45	159·2
10	6·74	0·86	−0·95	−6·01	6·09	171·0
11	18·91	0·83	+0·14	−6·57	6·57	181·2
12	31·06	−0·81	+1·29	−6·73	6·86	190·8
13	43·21	0·78	+2·43	−6·47	6·92	200·6
14	55·35	0·75	+3·49	−5·91	6·85	210·6
15	67·49	0·73	+4·38	−4·81	6·49	222·3
16	79·63	0·70	+5·03	−3·54	6·14	234·9
17	91·77	0·67	+5·38	−2·09	5·76	248·8
18	103·90	−0·64	+5·41	−0·56	5·44	264·1
19	116·04	0·61	+5·11	+0·96	5·21	280·6
20	128·18	0·59	+4·49	+2·41	5·07	298·2
21	140·33	0·56	+3·61	+3·71	5·16	315·8
22	152·48	0·53	+2·53	+4·82	5·45	332·3
23	164·64	0·50	+1·31	+5·70	5·87	347·1
24	176·80	−0·47	+0·02	+6·34	6·34	359·8

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Greenwich Midnight.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration Sel. Long. of the Earth.	Geocentric Libration Lat. of the Earth.	Combined Amount.	Direction.
1899. Nov. 25	188°·97	−0°·44	−1°·26	+6°·70	6°·83	10°·7
26	201·14	0·41	−2·43	+6·78	7·19	19·7
27	213·31	0·39	−3·45	+6·56	7·41	27·7
28	225·49	0·36	−4·26	+6·03	7·36	35·2
29	237·68	0·34	−4·81	+5·20	7·07	42·7
30	249·87	−0·31	−5·05	+4·16	6·56	50·5
Dec. 1	262·06	0·29	−5·00	+2·74	5·70	61·3
2	274·26	0·26	−4·65	+1·20	4·79	75·5
3	286·45	0·24	−4·03	−0·44	4·06	96·2
4	298·64	0·22	−3·20	−2·08	3·81	123·0
5	310·84	0·19	−2·20	−3·61	4·22	148·6
6	323·02	−0·17	−1·09	−4·92	5·02	167·5
7	335·20	0·14	+0·05	−5·94	5·94	180·5
8	347·37	0·11	+1·18	−6·58	6·71	190·2
9	359·54	0·08	+2·24	−6·81	7·15	198·2
10	11·69	0·06	+3·17	−6·63	7·37	205·6
11	23·84	−0·03	+3·95	−6·06	7·21	213·1
12	35·98	0·00	+4·55	−5·15	6·90	221·5
13	48·12	+0·04	+4·94	−3·96	6·32	231·3
14	60·25	0·07	+5·11	−2·57	5·72	243·3
15	72·38	0·10	+5·04	−1·07	5·14	258·0
16	84·51	0·13	+4·74	+0·47	4·77	275·7
17	96·64	0·16	+4·21	+1·95	4·63	294·9
18	108·77	0·20	+3·47	+3·32	4·79	313·7
19	120·91	+0·23	+2·53	+4·50	5·18	330·7
20	133·04	0·26	+1·43	+5·47	5·63	345·3
21	145·18	0·29	+0·21	+6·19	6·19	358·1
22	157·33	0·32	−1·06	+6·63	6·70	9·1
23	169·48	0·35	−2·34	+6·80	7·21	19·0
24	181·63	0·37	−3·55	+6·67	7·54	28·0
25	193·79	+0·40	−4·62	+6·25	7·75	36·5
26	205·96	0·42	−5·47	+5·53	7·80	44·7
27	218·13	0·45	−6·05	+4·54	7·56	53·1
28	230·31	0·47	−6·28	+3·28	7·10	62·5
29	242·49	0·50	−6·13	+1·82	6·38	73·5
30	254·67	0·52	−5·58	+0·11	5·58	88·9
31	266·87	0·54	−4·64	−1·46	4·87	107·5
1900. Jan. 1	279·06	+0·57	−3·38	−3·07	4·56	132·2

This ephemeris has been constructed for Greenwich midnight instead of noon as heretofore. It is hoped that this change will render its use more convenient to observers in Europe.

The longitudes are reckoned in the plane of the Moon's equator, the axis of reference being the radius which passes through the mean centre of the visible disc. This axis therefore rotates with the Moon, and is not fixed in space.

The inclination of the Moon's equator to the ecliptic is taken as 1°·523, the value used in the *Connaissance des Temps*, that given by the *Nautical Almanac* being 1°·536.

The principal term of the physical libration in longitude has been applied as before, the expression for it being —0°·037 × sine Sun's mean anomaly.

The colongitude of the Sun is 90° (or 450°) *minus* his selenographical longitude. It also is the selenographical longitude of the morning terminator reckoned eastward from the mean centre of the disc. Hence its value is approximately 270°, 0°, 90°, 180° at new Moon, first quarter, full Moon, last quarter respectively. The longitude of the evening terminator is of course 180° greater or less than that of the morning one.

When the geocentric libration in longitude is positive, the region brought into view is on the west limb ; when negative, on the east.

When the geocentric libration in latitude is positive, the region brought into view is at the Moon's north pole ; when negative, at the south.

The column "Combined Amount" gives the distance between the apparent and mean centres of the disc, and the column "Direction" gives the position angle of the apparent centre from the mean centre, or, which is the same thing, the position angle of the region which is most carried into view by libration. The angles are reckoned eastward from the northern extremity of the Moon's axis.

The terms "East" and "West" are used throughout with reference to our sky, and not as they would appear to an observer on the Moon.

Benvenue, 55 *Ulundi Road, Blackheath, S.E. :*
1899 *June* 10.